Data Collection Activity - Bounce Back!

In this problem, we will use the data collected from the Ball Bounce Problem to determine how the bounce height of the racquetball varies from bounce to bounce.

1. Using the distance vs. time scatterplot of the "ball bounce" data, trace along the bouncing ball data. Start with the initial release height and record consecutive bounce heights (the y-values at the vertex of each parabolic section) in the table below. (Bounce #0 represents the initial drop height). Round your answers to the nearest hundredth.

Bounce Number	0	1	2	3	4	5	6	7
Bounce Height								

2. Enter the data in your table into two lists of your calculator. (Use **L3** and **L4** if you want to keep the original data in **L1** and **L2**). Make a scatterplot of this data and sketch it below.

3. The model for this bouncing ball data is an ***exponential function.*** We will attempt to fit this data with an exponential function of the form:

$$y = a \cdot b^x$$

where **x** represents ______________________ and **y** represents the corresponding ______________________ Explain what the value of **a** represents in your function. Record this value of **a** below.

a represents ______________________

a= ____________

4. To find the value of **b**, select another ordered pair from your scatterplot (not close to the first data point) , substitute the values for **x** and **y** into the exponential equation (along with the value of **a**), and solve for **b**. Show your work below and record your final function. (Round the value of b to the nearest hundredth.) When finished, graph the function to see how it fits the data.

y = ______________________

5. The value of **b** also has a "real world" meaning to the problem. Explain what the value of **b** represents to the problem situation. (Hint: It is a decimal!) Be specific!

b represents ____

6. As a check, of the equation in part 4, perform an *exponential regression* (**ExpReg L3,L4**) on the data which will allow the calculator to find the "best-fitting exponential function" through the set of data in the scatterplot. The values found for **a** and **b** in parts 3 and 4 should be similar to the values from the exponential regression. Again, round all values to the nearest hundredth and record this equation below.

y = ______________________________

7. Rewrite the equation using the words "Bounce Number" and "Bounce Height", instead of the variables **x** and **y**.

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8. Using the exponential regression model in part 6 above, write an equation to determine the smallest number of bounces required for the bounce height to be less than 10% of its starting/drop height. Solve this equation graphically When writing the final answer, remember that the number of bounces must be an integer value.

Bounce number __________